

Update on Lyme Disease Reporting and Surveillance, Wisconsin, 2013

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608-267-0249

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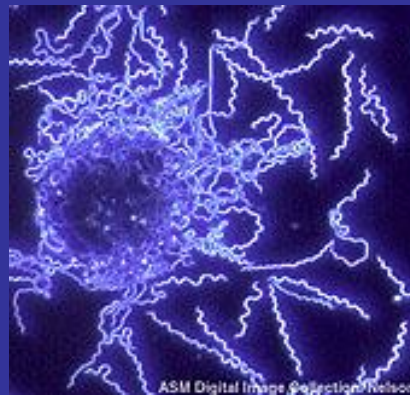


Protecting and promoting the health and safety of the people of Wisconsin

Overview

- **Lyme disease and tick vector characteristics.**
- **Laboratory testing, results, and interpretations.**
- **Epidemiology and Statistics.**
- **Treatment and Prevention.**
- **Review of reporting requirements in Wisconsin.**

Lyme Disease



Bacteria - *Borrelia burgdorferi*

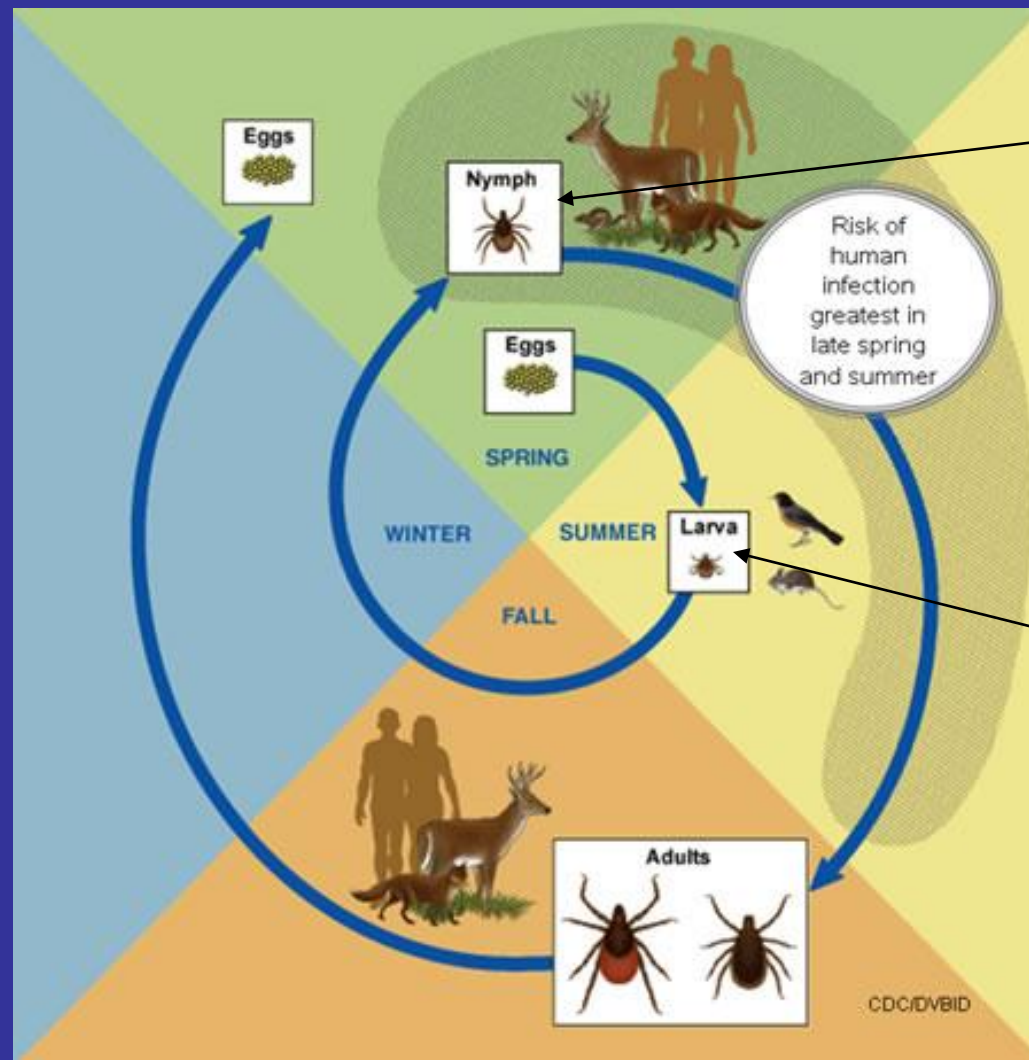
Ixodes scapularis

Transmit

- Lyme disease.
- Babesiosis.
- Anaplasmosis.
- Ehrlichiosis.
- Powassan infection.



Life Cycle of Blacklegged Tick



Based on EM case onsets, nymphs account for most transmission.

Larva do not transmit bacteria to humans.

During the 2-year life cycle, total 3 blood meals.

Courtesy of CDC

Ixodes scapularis (Blacklegged or Deer Tick)

Adult
female deer
tick

Adult
male
deer tick

Nymph

Larva



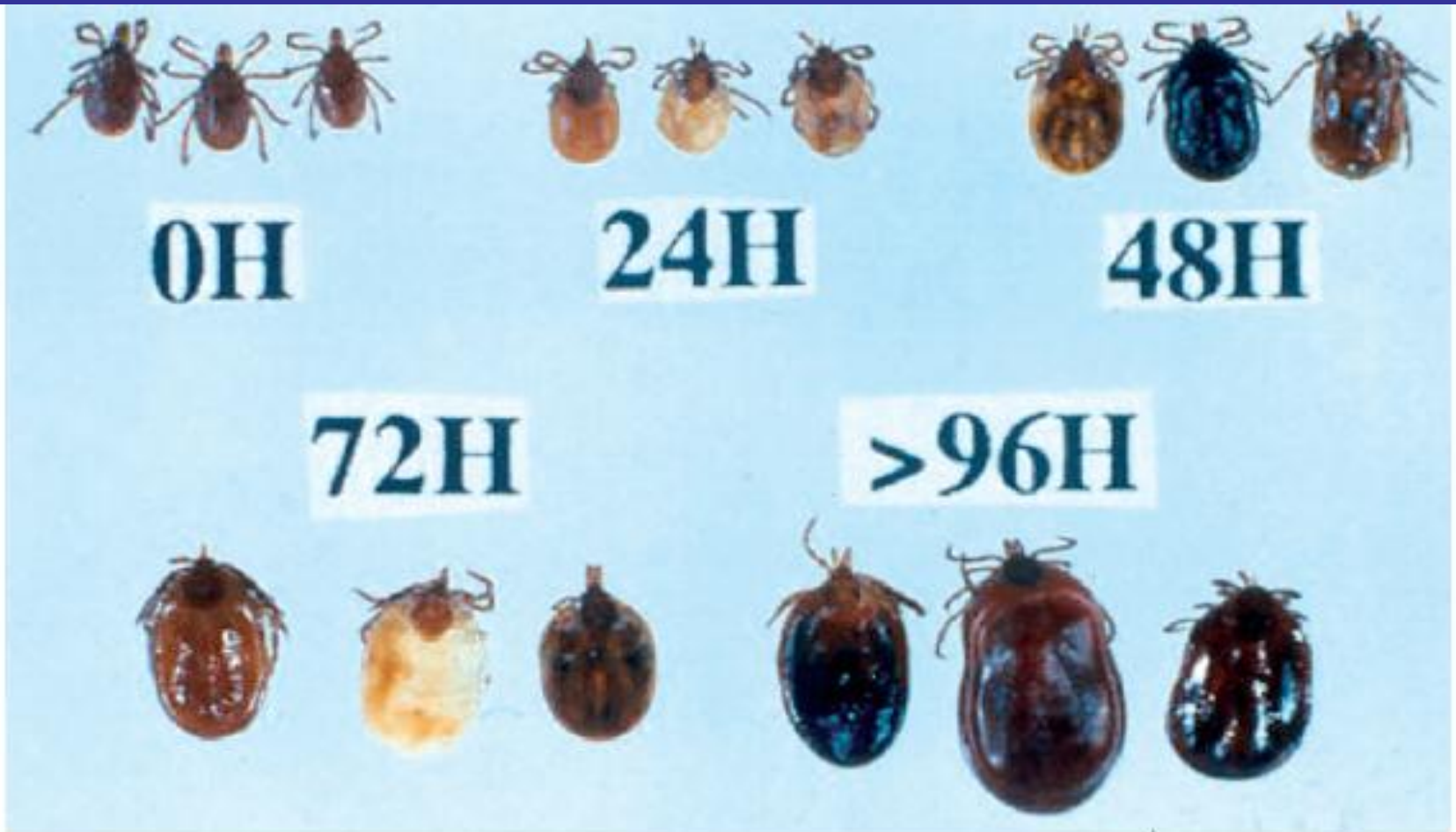
One Inch

*Dermacentor
variabilis*
(American dog
or wood tick).



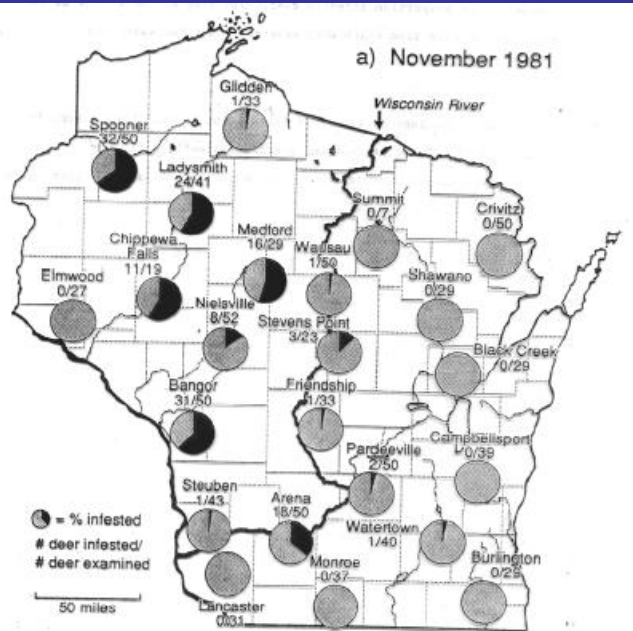
Smaller than an
American dog/wood
tick, adult female
and nymph can
transmit infection
through a bite for a
blood meal.

Stages of blood engorgement in female adult *Ixodes* ticks depicted by the durations of attachment (courtesy of the IDSA, Dr. Richard Falco-Fordham University).

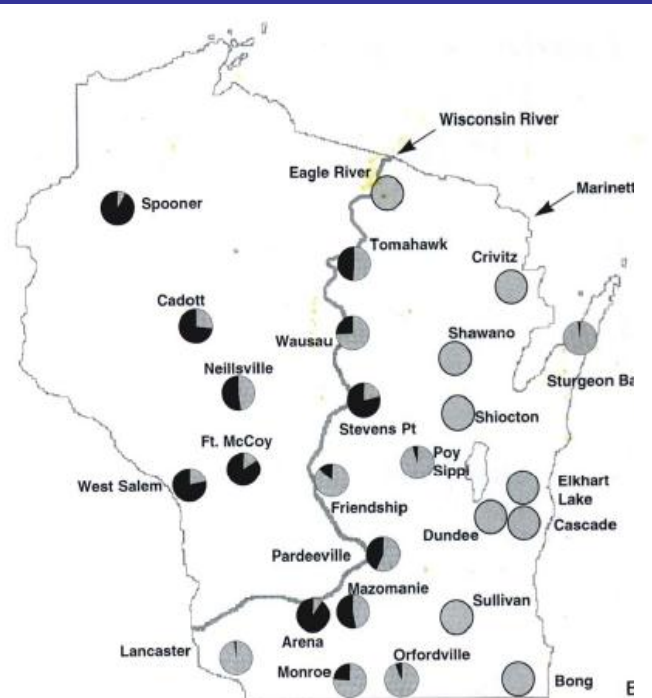


UW-Madison, Department of Entomology - Tick Surveillance

1981

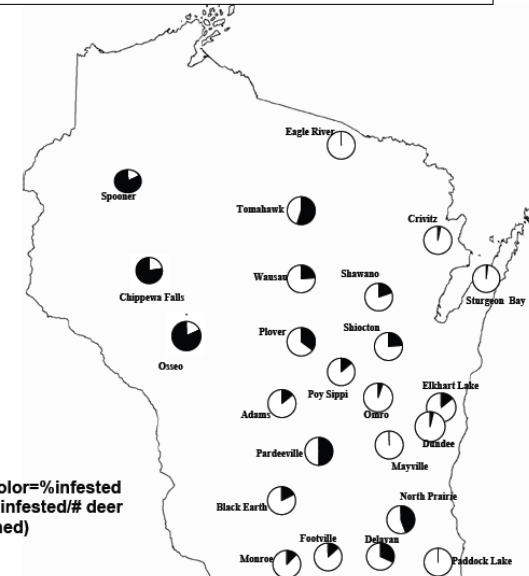


1994



2008-2009

Wisconsin Surveillance of Ticks Collected from Deer During Hunting Season, 2008-2009



Dark color = % infested
 (# deer infested / # deer examined)

Dark color of the pie = % deer infested with *Ixodes* ticks.

The Ticks Are Marching On...

Surveillance by the UW-Madison, Department of Entomology in 2010-2011

- *Ixodes* species ecology is established in urban parks in Madison (Arboretum, Sandburg, and Pheasant Branch Conservancy).
- Milwaukee County, Bayside Doctor's Park.
- Kettle Moraine in southern Waukesha County.
- Spring Green in Sauk County.
- Average state infectivity rate for *Borrelia* in nymphs is 22% (20-24%); other tickborne diseases infectivity rate are unknown.

Surveillance in WI, 2002-2011

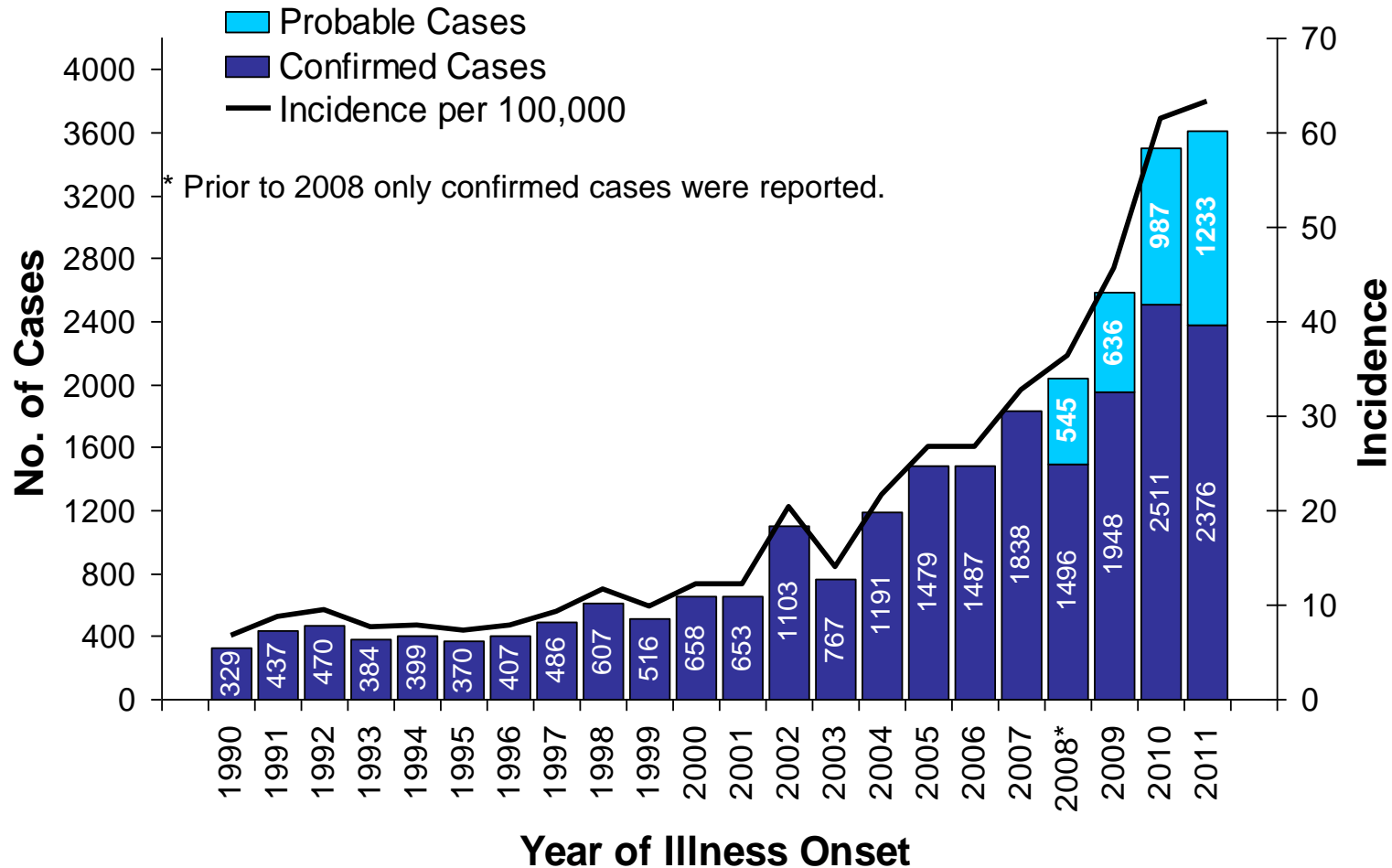
Tickborne Infections Total	Total Cases (%)	
	2011** n = 4,103	2002-2010 n = 16,996
• Powassan	4 (0.09)	7 (0.04)
• Lyme disease	3,313 (81)	14,876 (86)
• Anaplasmosis/Ehrlichiosis	697 (17)	1,968 (11)
• Babesiosis	79 (1.9)	125 (0.7)
• Spotted Fever Rickettsiosis (SPF)*	10 (0.24)	20 (0.1)

* Travel related infections.

**2011 numbers included confirmed and probable cases.

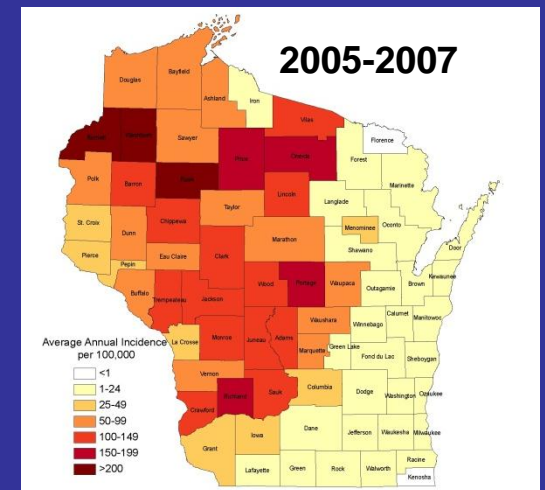
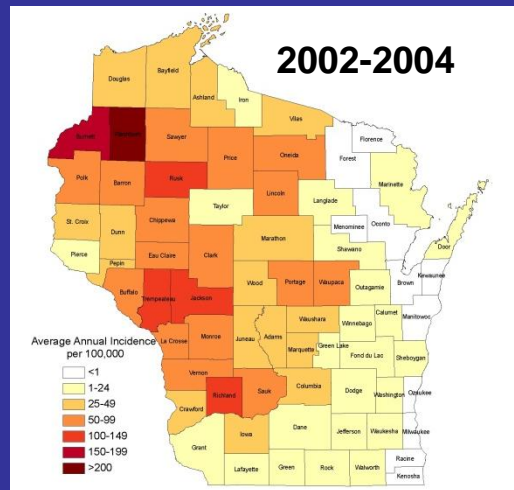
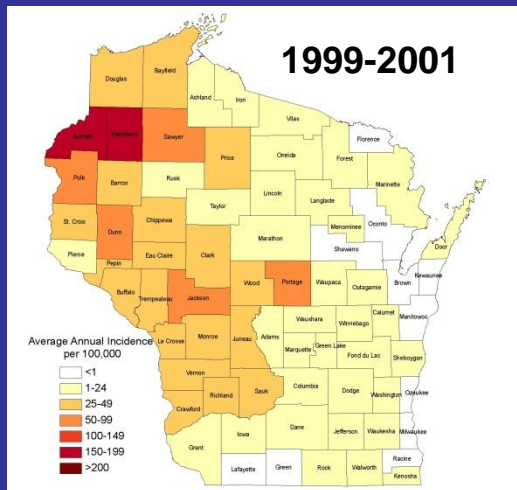
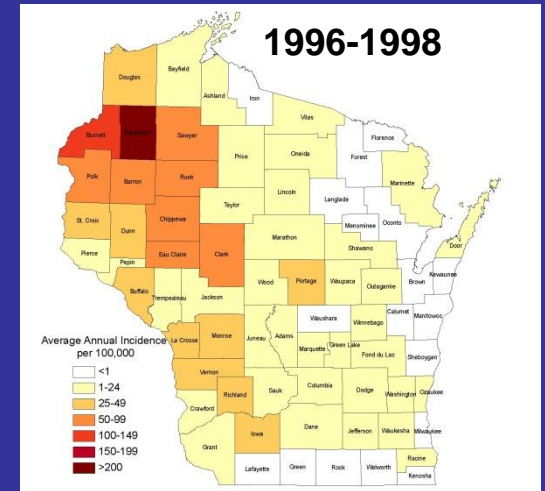
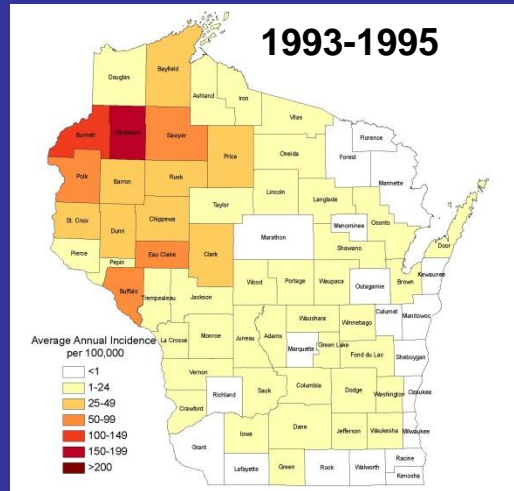
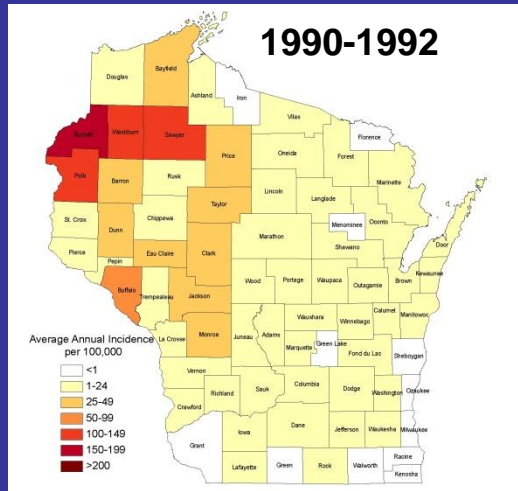
Reported Lyme Disease, WI, 1990-2011

(n=25,313)



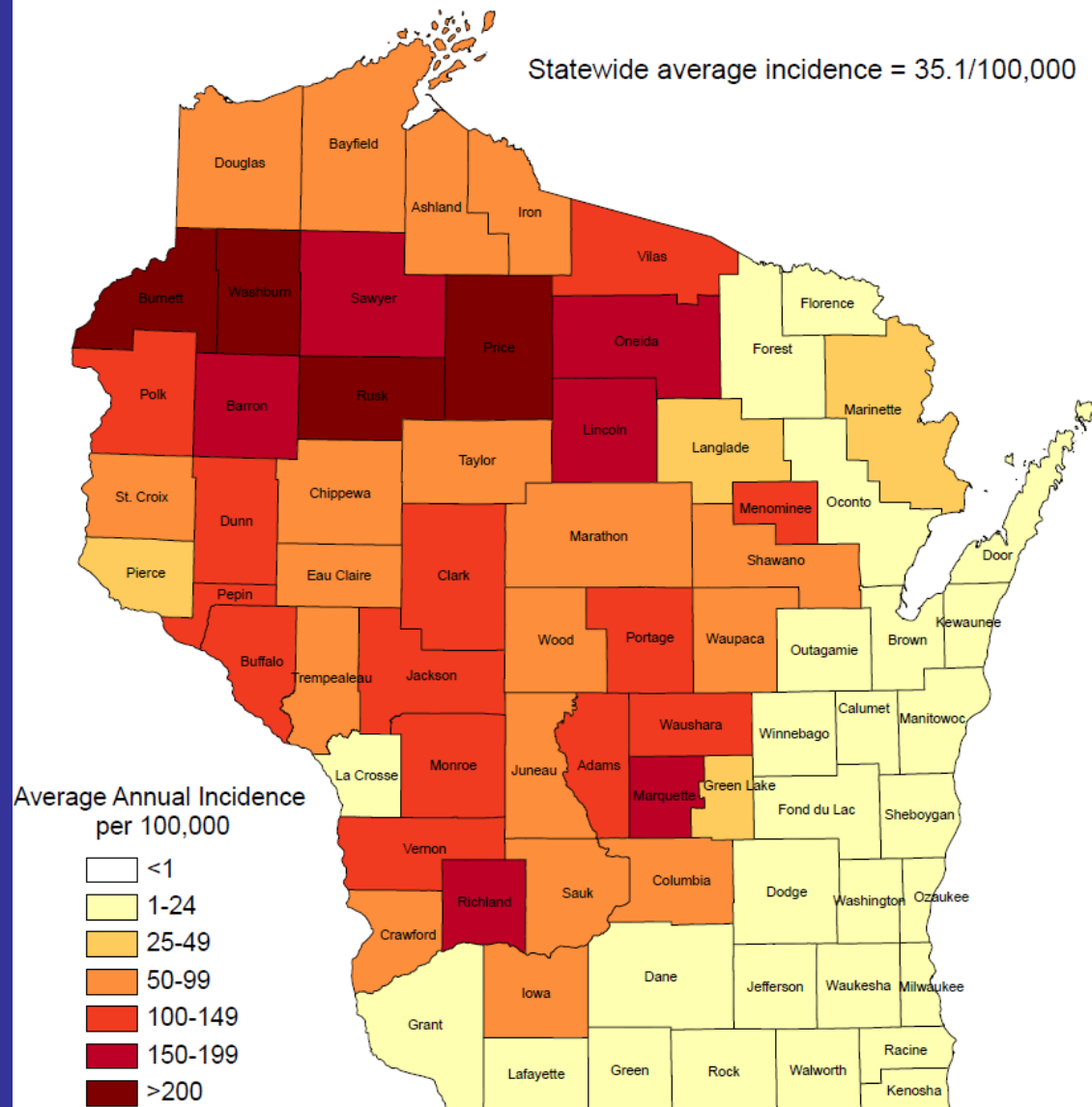
* Previous to 2008 only confirmed cases were reported. Beginning 2008, the total number of cases includes confirmed and probable cases.

Lyme Disease Average Annual Incidence Wisconsin, 1990-2007, by County of Residence



Lyme Disease Average Annual Incidence Wisconsin, 2008-2010

Statewide average incidence = 35.1/100,000



This map is based on the county of residence of confirmed cases.
Some infections may have been acquired during travel to other areas.

Lyme Disease

- Typical symptoms include...
 - Fever
 - Headache
 - Fatigue
 - Characteristic skin rash, erythema migrans, seen in approximately 80% of cases
- If left untreated, infection can spread to joints, the heart, and the nervous system

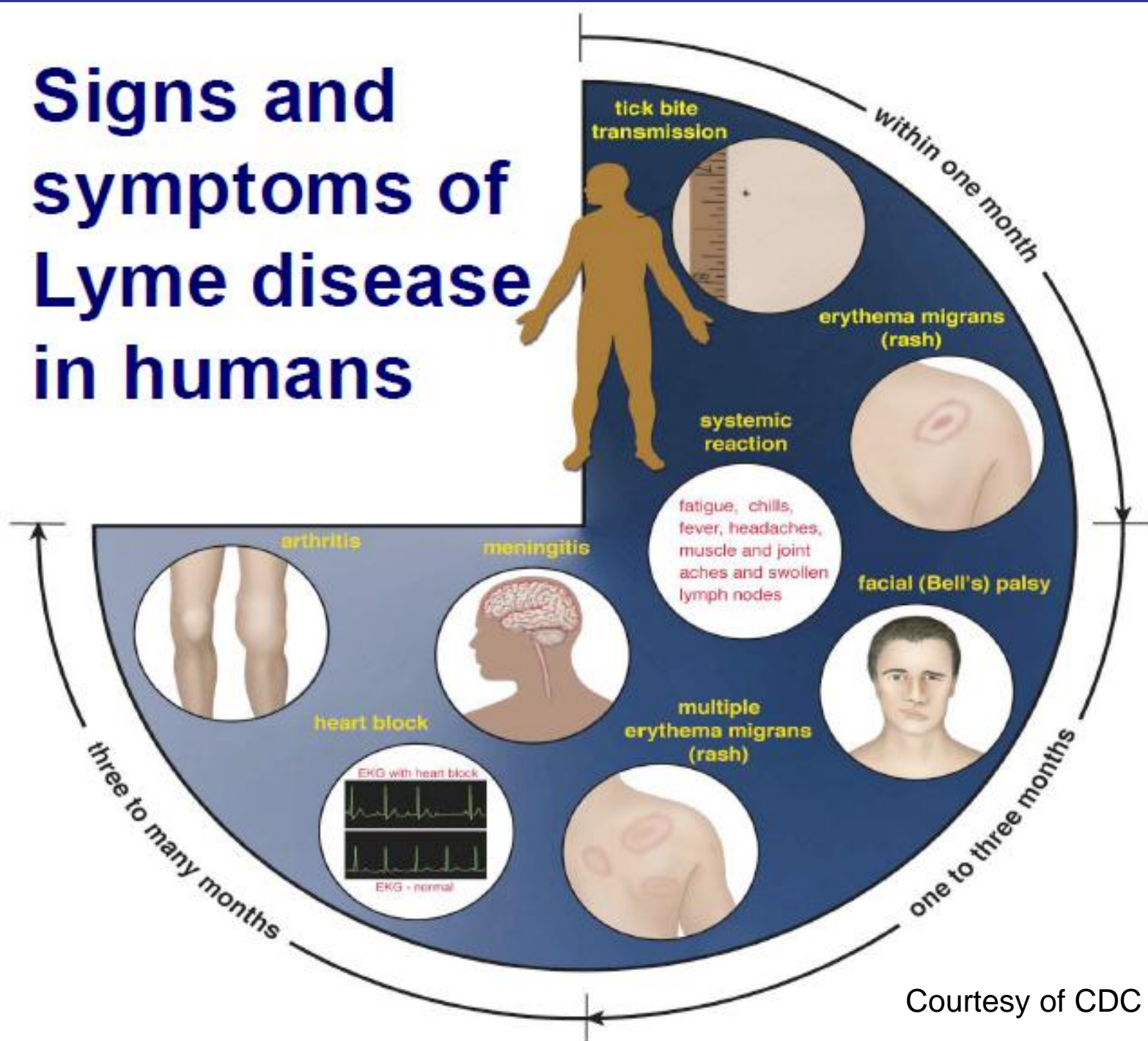


Early Localized Stage - Erythema Migrans (EM)

- Ticks must be attached for at least 24 to 48 hours to transmit *Borrelia* bacteria.
- The EM rash expands in size over time whereas an allergic reaction stays the same size.
- Illness including EM rash can occur within 30 days of tick bite (70% people).
- Since Lyme disease is endemic in WI, EM rash ($\geq 5\text{cm}$) is considered as a confirmed case with or without lab testing and should be reported to health departments.

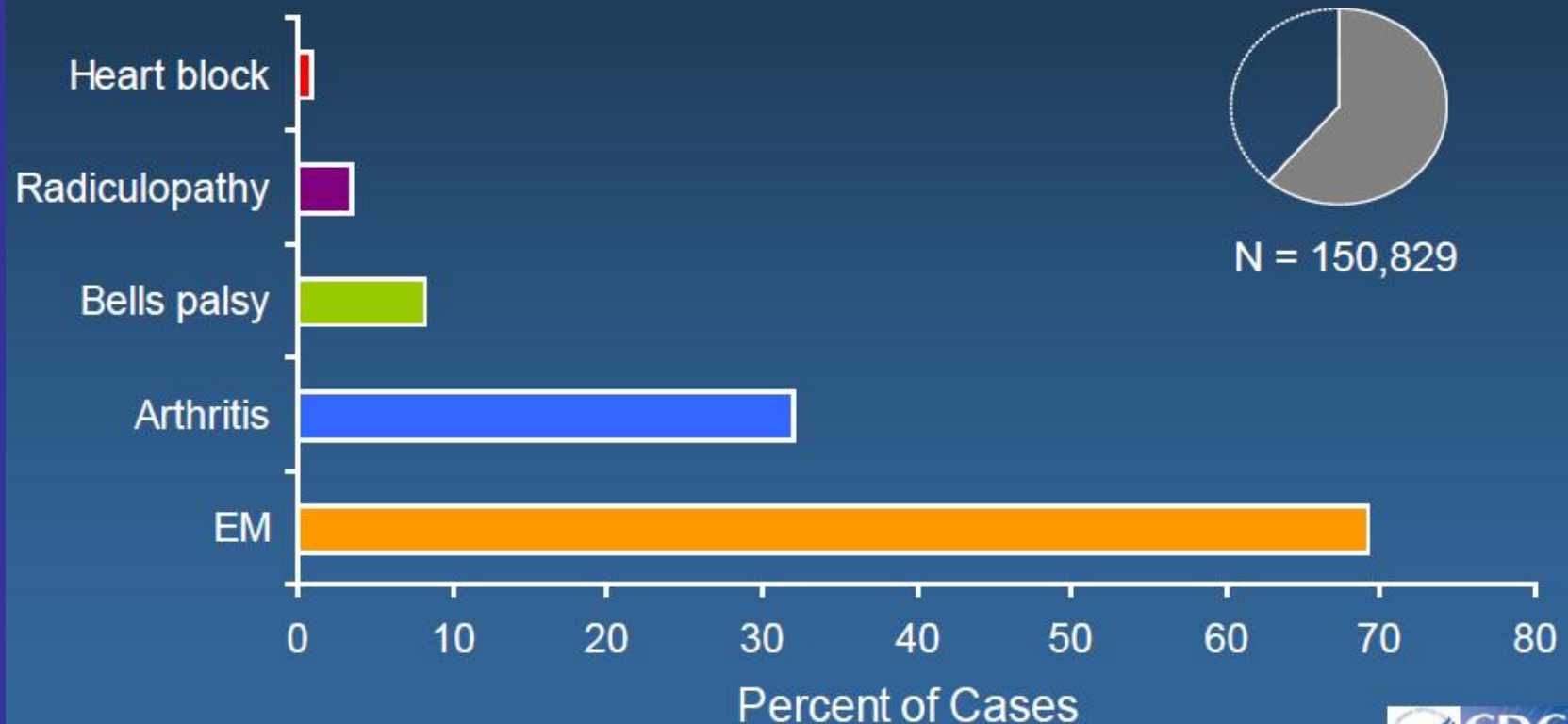


Signs and symptoms of Lyme disease in humans



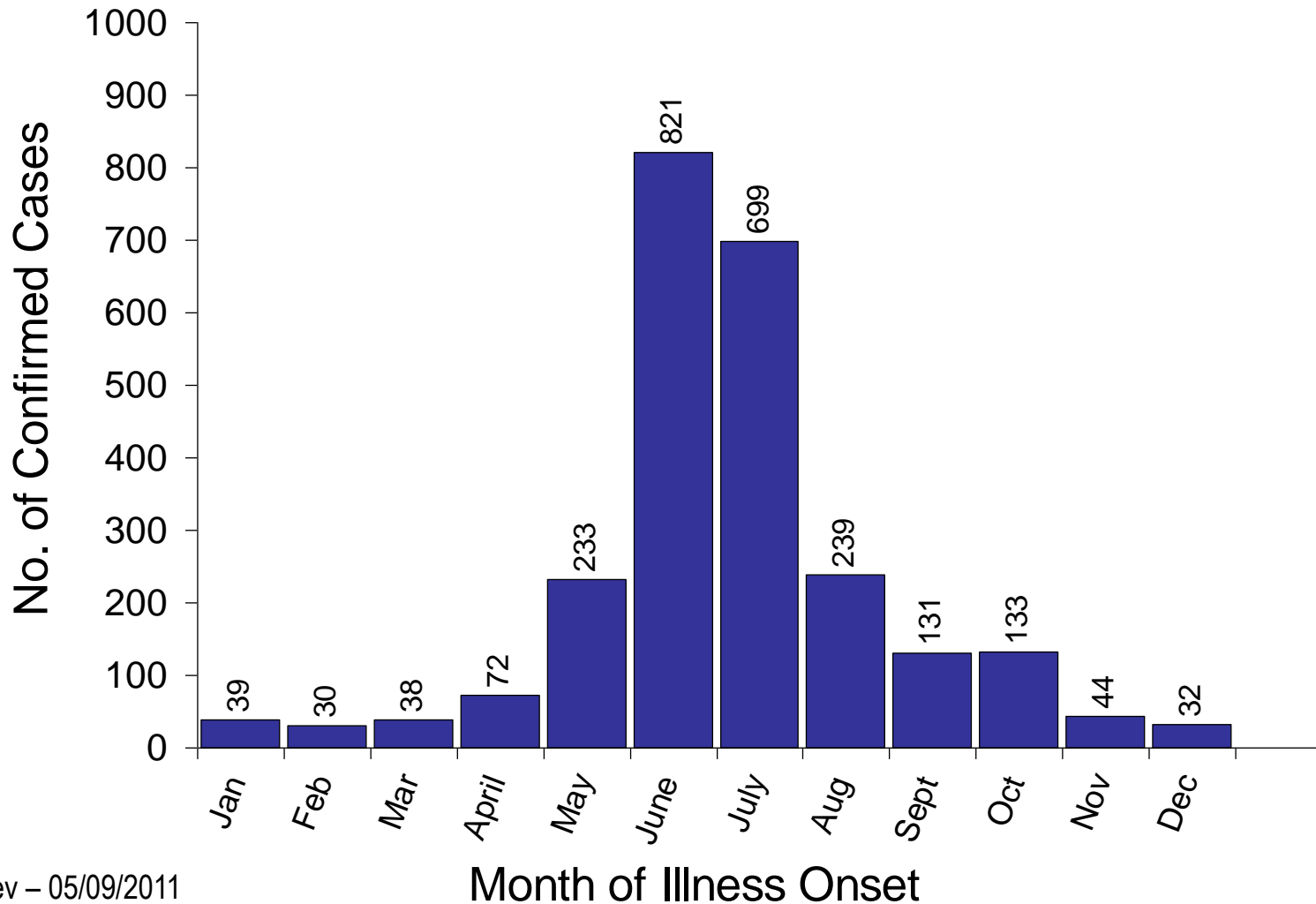
Courtesy of CDC

Clinical features of Lyme disease cases reported to CDC, United States, 1992-2006



Confirmed Lyme Disease Cases

Reported by Month – WI 2010 ($n=2,511$)

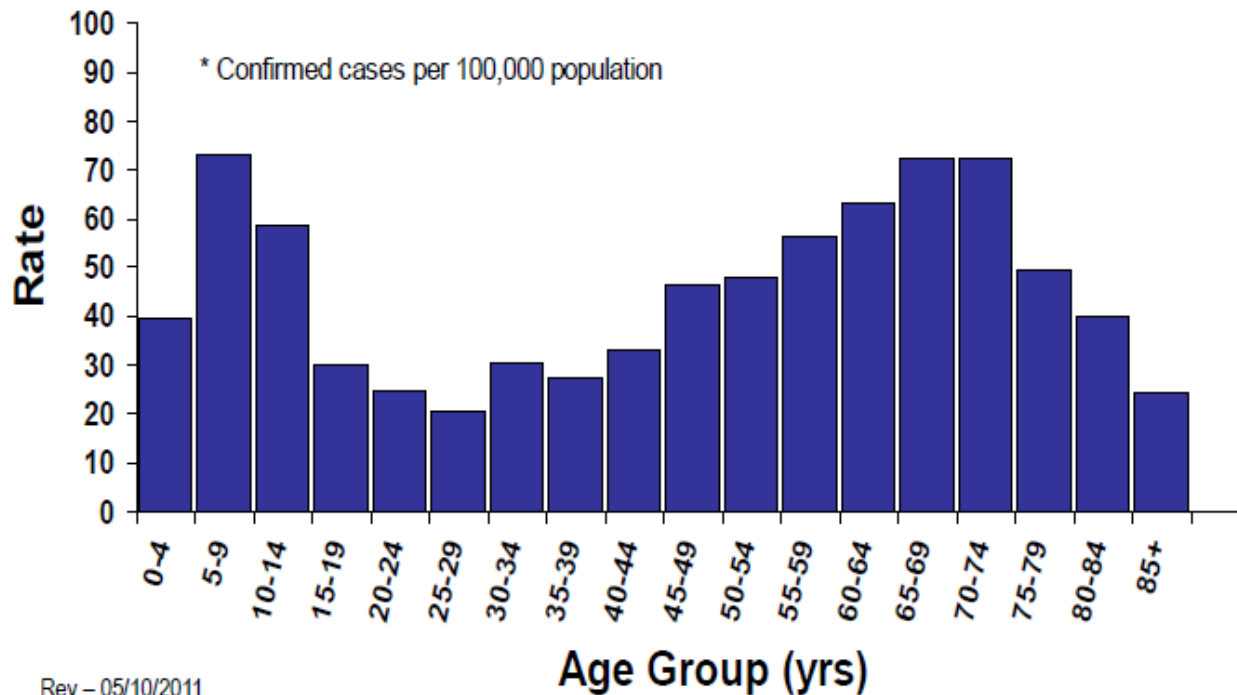


Rev – 05/09/2011

Confirmed Lyme Disease by Age Group, WI, 2010

Rate* of Confirmed Lyme Disease

Reported by Age Group – WI 2010 ($n=2,511$)



Rev – 05/10/2011



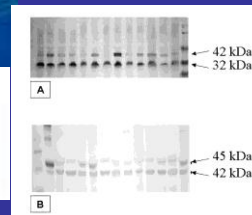
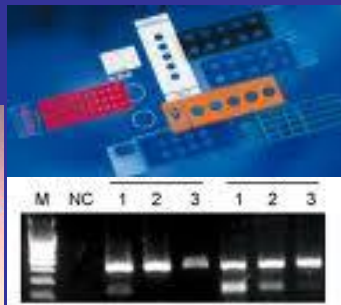
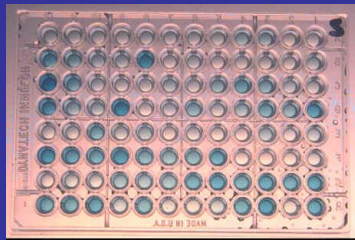
Lyme Disease- Testing Methods

Most common serologic assays to detect antibodies include:

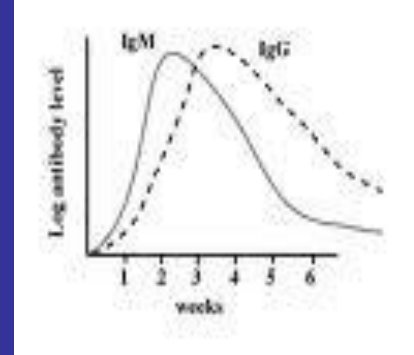
- Enzyme immunoassay (EIA) tests.
- Immunofluorescent assays (IFA).
- Western Blot test for IgM and IgG antibodies to *B. burgdorferi*.

Other less common tests:

- Culture - detects growth of organism to confirm active infection.
- PCR - molecular method of detecting DNA of organism (synovial fluid).



Lyme Disease- Antibody Response



Both IgM and IgG can persist for years (10-20yrs).

- Specific IgM response
 - Produce earlier than IgG.
 - Peaks within the first several weeks.
 - IgM is less specific than IgG.
 - Because testing for IgM can have false positive results and false negative results, it is less reliable as a marker for Lyme disease.
 - Generally highest among patients with early infection.

Lyme Disease - Antibody IgG Response

- IgG antibody response is much more specific than IgM and it is the more reliable marker for Lyme disease.
 - IgG is produced a few weeks after IgM.
 - Peaks months to years.
 - Generally highest in later stages of infection.
 - Most active infections should have a positive IgG test result in one month.

Lyme Disease - Treatment

- CDC uses the guidelines by the Infectious Diseases Society of America (IDSA).
- Antibiotics are very effective if treated early.
 - Children ≥ 8 yrs and adult = doxycycline 100mg 2x/day for 14 days.
 - Children < 8 yrs = amoxicillin 50mg/kg/day in 3 divided doses
- Usually given orally but may be given intravenously in more severe cases.
- Recurrent symptoms may require a second course of antibiotic.
- Long-term intravenous courses (months to years) have not been shown to be beneficial but may cause more complications (gallstones, catheter-associated bloodstream infections).



Prevention

- Prophylaxis (follow the IDSA guidelines).
 - 1 single dose of doxycycline (200mg) for adults and children ≥ 8 yrs, if it is given within 72 hrs after tick removal, tick has to be attached for at least 36hrs, and should only be used in area with at least 20% tick infectivity.
 - WI meets criteria because average nymphal tick infectivity rate is about 22% (range from 20-24%) statewide.
- No lasting immunity, can get infected more than once.
- No current available vaccine for humans since 2002, on-going research.

Review of the Changes in Lyme Disease Reporting Requirement, June 2012.

Why Are Tickborne Infections Reportable?

- Define demographic, geographic, and seasonal distribution.
- Monitor disease trends in a more consistent and unified manner with the same case definition for reporting.
- Identify areas where tickborne diseases may be emerging and risk exposures to WI residents.
- Evaluate where to target education, prevention, and control measures.
- Define disease characteristics and sequelae.
- Determine if the current diagnosis and treatment process is effective.
- Data available for future funding and research.

Reasons for Changes in Reporting Requirements in 2012

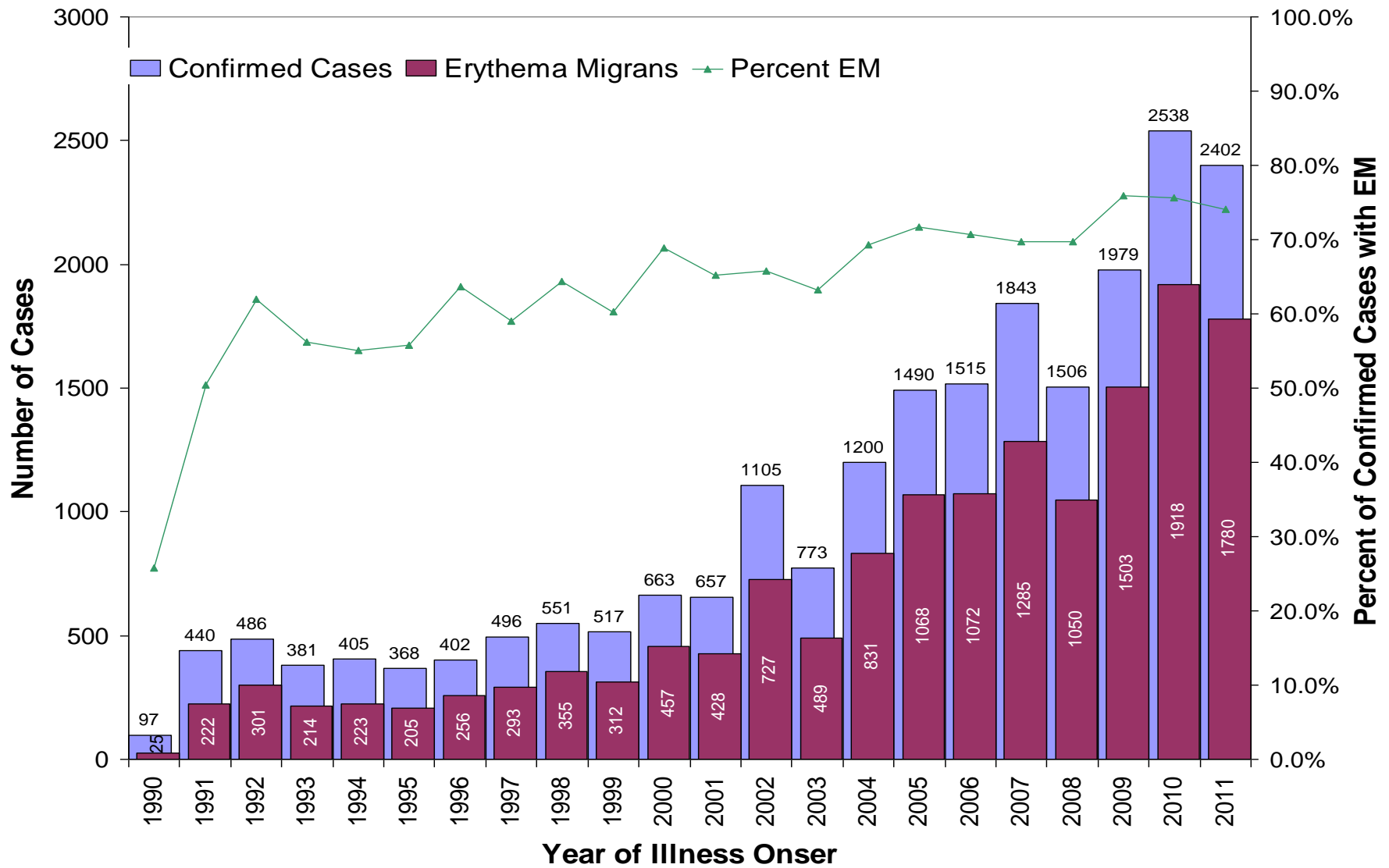
Increased burden of Lyme disease reporting due to:

- Implementing the 2007 surveillance case definition that included investigating all reported positive laboratory results to classify cases according to the confirmed and probable criteria.
- Electronic reporting of laboratory results in the Wisconsin Electronic Diseases Surveillance System (WEDSS) has increased the workload (2-3 times prior to WEDSS) for state, local health departments (LHDs), and providers.

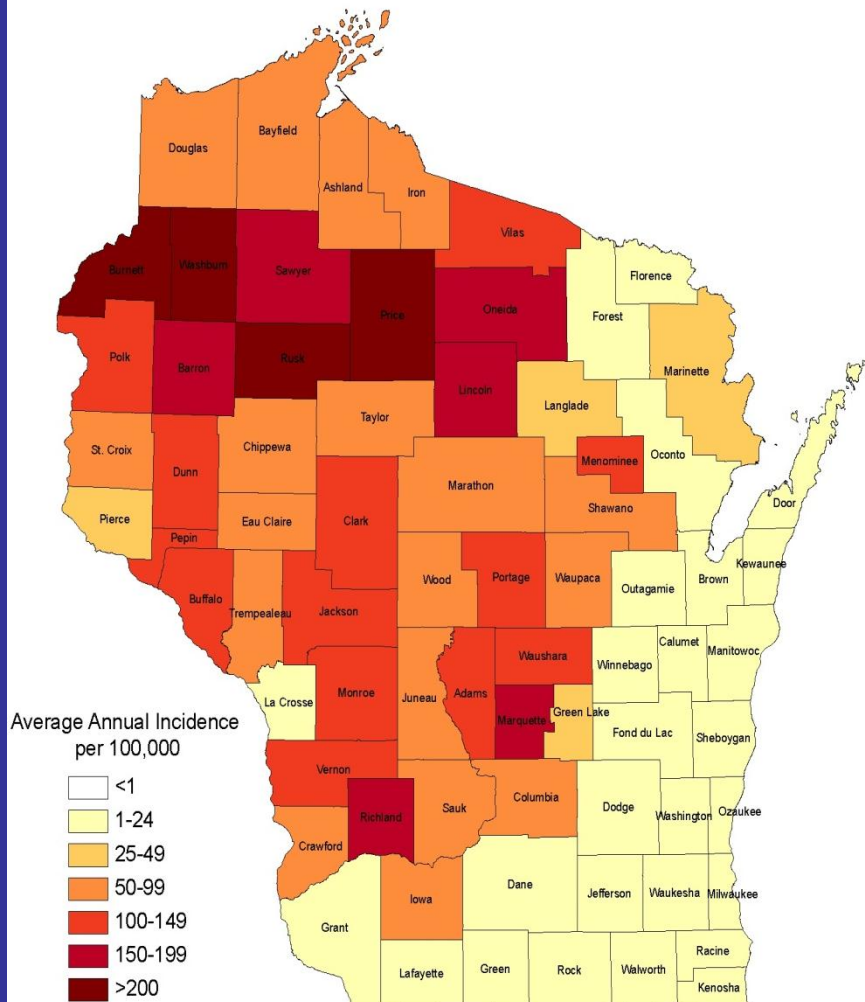
Some of the challenges identified by LHDs:

- Currently not sustainable long term, not a good use of reduced and limited resources and personnel, no funding for Lyme disease surveillance.
- Low priority on the LHDs list of communicable diseases.
- Negatively impacts investigation of other diseases at the LHD and provider level.

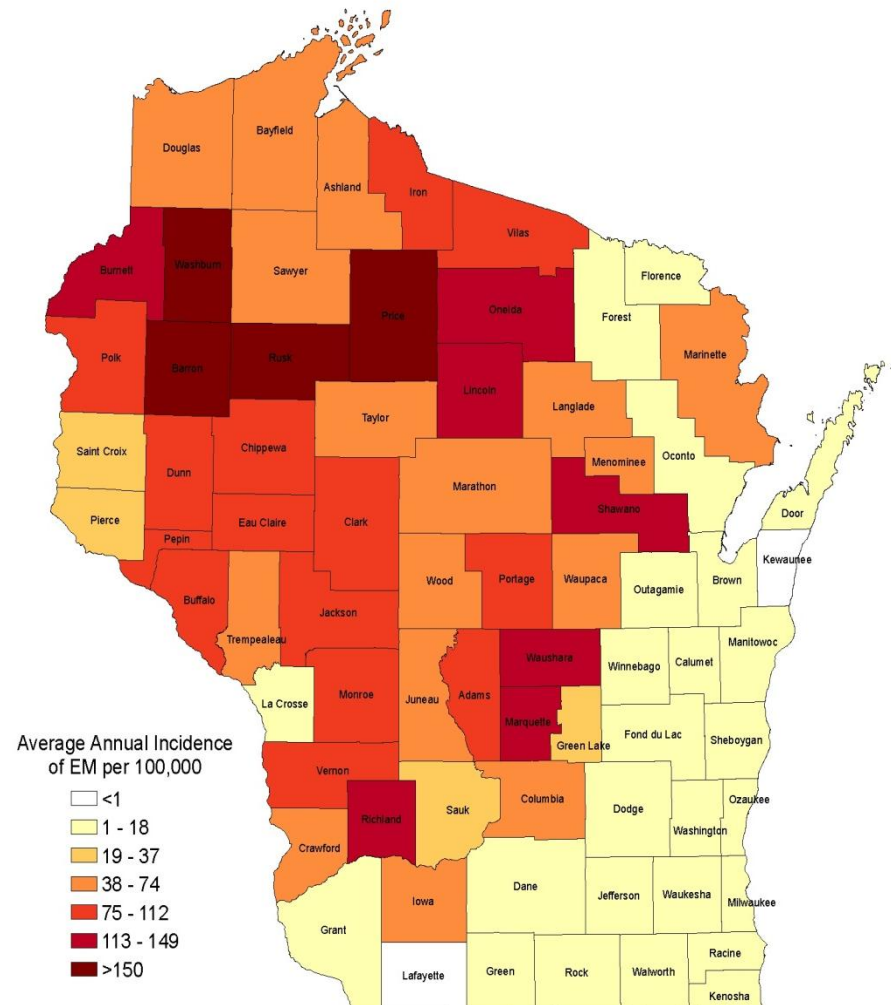
Reported Confirmed and EM cases in WI, 1990-2011



Lyme Disease Average Annual Incidence Wisconsin, 2008-2010



Lyme Disease Erythema Migrans Average Annual Incidence Wisconsin, 2008-2010



Reporting Requirements as of June 2012

Required reporting:

- Laboratories continue to report all Lyme positive results.
- Health care providers continue to report all cases of erythema migrans (EM ≥ 5 cm and diagnosed by a physician or medical personnel).
- Continue to report date of illness onset and patient demographic information (address, birthdate, gender, race, and ethnicity).
- Reporting can be by electronic via WEDSS or hard copy.

Optional reporting:

- Reporting of Lyme disease cases without EM rash is now optional, unless requested by the LHDs (these include non-EM confirmed and probable cases).
- Reporting of signs and symptoms other than EM rash, exposure, and treatment information is now optional, unless requested by the LHDs.

Note: It is the responsibility of each LHD to educate their providers on the changes in requirements and the specific needs within their jurisdiction.

How are Lyme Disease reports being reported electronically?

- Lyme Disease Incidence:
 - Web reports in staging area from medical providers using electronic reporting into WEDSS.
 - Imported by LHD into WEDSS for reports within their jurisdiction.
- Lyme Laboratory Reports:
 - Automated import of reports directly into WEDSS, bypassing staging area.
 - Some reports may be misclassified as “Unknown Disease” by laboratories during data entry into the staging area.
 - These reports will be imported into WEDSS by DHS staff.

**What to do with all the
positive laboratory reports?**

Lyme Laboratory Report Form in WEDSS

Disease Incident		
Patient: TEST,AMY	Incident ID: 916761	Process Status: Result Imported
DOB: 01/01/1902	Disease: LYME LABORATORY REPORT	Resolution Status: Suspect
<div> <div>Patient</div> <div>Supplemental</div> <div>Investigation</div> </div>		
* Disease Being Reported LYME LABORATORY REPORT		
* Last Name TEST	* First Name AMY	Middle Name <input type="text"/>
Future Client No. <input type="text"/>	DOB (MM/DD/YYYY) 01/01/1902	Age 111
Address Number & Street 1 W Wilson St		Apartment/Unit Number <input type="text"/>
City Madison	State WI	Zip 53703
Census Tract 001705	County of Residence DANE, WI	Country of Residence <input type="text"/>
Country of Birth <input type="text"/>	Date of Arrival (MM/DD/YYYY) <input type="text"/>	
Home Telephone <input type="text"/>	Cellular Phone / Pager <input type="text"/>	Work/School Telephone <input type="text"/>
E-mail Address <input type="text"/>	Other Electronic Contact Information <input type="text"/>	
Work/School Location <input type="text"/>	Work/School Contact <input type="text"/>	
Gender Female	Pregnant? <input type="radio"/> Yes <input type="radio"/> No <input checked="" type="radio"/> Unknown	Estimated Delivery Date <input type="text"/>
Marital Status <input type="text"/>	Medical Record Number <input type="text"/> View...	Patient's Parent/Guardian Name <input type="text"/>
Occupation Setting <input type="text"/>	Describe/Specify <input type="text"/>	
<div> <div>Primary Language <input type="text"/></div> <div>Ethnicity Hispanic or Latino</div> <div>Race <input type="checkbox"/> American Indian or Alaska Native <input checked="" type="checkbox"/> Asian <div>Specify</div> <div>Asian - Burmese</div> <input type="checkbox"/> Black or African American <input type="checkbox"/> Native Hawaiian or Other Pacific Islander <input type="checkbox"/> Other <input type="checkbox"/> Unknown <input type="checkbox"/> White </div> <div>Reported Race Asian</div> </div>		

Lyme Laboratory Report Form in WEDSS

Disease Incident

?

Patient: TEST,AMY

Incident ID: 916761

Process Status: Result Imported

DOB: 01/01/1902

Disease: LYME LABORATORY REPORT

Resolution Status: Suspect

Patient

Supplemental

Investigation

Case Information

Jurisdiction

Training

Secondary Jurisdiction

Investigator

Reporting Source

* Provider

***DO NOT DELETE THIS PROVIDER-CLICK NEW TO CREATE

Submitter Name

Lab

Additional Provider

Additional Lab

Link to Animal Report

View

Index Case Cluster ID

Dates

Date of Onset

☐ Asymptomatic

(Lab Specimen) Collection Date

Date of Diagnosis

Date of Death

Date Received

Date Created

02/25/2013

Episode Date

Date Closed

Date Admitted

Date Discharged

Statuses

* Process Status

Result Imported

Result Imported

Follow-up Initiated

Follow-up Complete

Set to: Not a Case

Reported by:

☐ Web Report

☐ Lab Report

☐ EHR Report

Imported Status

* Resolution Status

Suspect

Final Disposition

Transmission Status

Date Sent

Last CDC Update

Changing Lyme Laboratory Report Form to a Lyme Disease Incidence in WEDSS

Disease Incident

Patient: TEST,AMY Incident ID: 916761 Process Status: Result Imported
 DOB: 01/01/1902 Disease: LYME LABORATORY REPORT Resolution Status: Suspect

Patient Supplemental Investigation

* Disease Being Reported LYME LABORATORY REPORT

* Last Name TEST

Future Client No.

Address Number & Street 1 W Wilson St

City Madison

Census Tract 001705

Country of Birth

Home Telephone

E-mail Address

Work/School Location

Gender Female

Pregnant? Yes No Unknown

Estimated Delivery Date

Marital Status

Medical Record Number

Patient's Parent/Guardian Name

LYME DISEASE

CRYPTOSPORIDIOSIS

GIARDIASIS

GONORRHEA

NOROVIRUS INFECTION (NORWALK/NORWALK-LIKE)

PELVIC INFLAMMATORY DISEASE (NON GC, NON CT)

SHIGELLOSIS

STREPTOCOCCAL DISEASE, INVASIVE, GROUP A

STREPTOCOCCAL DISEASE, INVASIVE, GROUP B

STREPTOCOCCUS PNEUMONIAE, INVASIVE DISEASE

SYPHILIS REACTOR

SYPHILIS, EARLY LATENT

SYPHILIS, LATE LATENT

SYPHILIS, LATE WITH CLINICAL MANIFESTATIONS

SYPHILIS, NEUROSYPHILIS

SYPHILIS, PRIMARY

SYPHILIS, SECONDARY

SYPHILIS, UNKNOWN DURATION

VARICELLA (CHICKENPOX)

----- Secondary Disease -----

----- Other Disease -----

AMEBIASIS

CAT SCRATCH DISEASE

ENCEPHALITIS, VIRAL (OTHER)

HEAD LICE (PEDICULOSIS)

LYME LABORATORY REPORT

MENINGITIS, ASEPTIC (VIRAL)

METHICILLIN-RESISTANT S. AUREUS, ISOLATED

SCABIES

Test disease

Primary Language

Ethnicity Hispanic or Latino

Race

☐ American Indian or Alaska Native

☒ Asian

Specify

Asian - Burmese

☐ Black or African American

☐ Native Hawaiian or Other Pacific Islander

☐ Other

☐ Unknown

☐ White

Reported Race Asian

Lyme Disease Incidence Form in WEDSS

Disease Incident					
Patient: TEST,AMY		Incident ID: 916760		Process Status: New	
DOB: 01/01/1902		Disease: LYME DISEASE		Resolution Status: Suspect	
Patient	Supplemental	Lyme-LabClinical	Lyme-Risk	Lyme-Intervntn	Investigation
* Disease Being Reported LYME DISEASE					
* Last Name TEST		* First Name AMY		Middle Name	Name Suffix
Future Client No.		* DOB (MM/DD/YYYY) 01/01/1902		Age 111	Months
Address Number & Street 1 W Wilson St		Apartment/Unit Number		Zip 53703	
City Madison		State WI		Country of Residence DANE, WI	
Census Tract 001705		County of Residence		Country of Residence	
Country of Birth		Date of Arrival (MM/DD/YYYY)		Primary Language	
Home Telephone		Cellular Phone / Pager		* Ethnicity Hispanic or Latino	
E-mail Address		Other Electronic Contact Information		* Race <input type="checkbox"/> American Indian or Alaska Native	
Work/School Location		Work/School Contact		<input checked="" type="checkbox"/> Asian	
* Gender Female		Pregnant? <input type="radio"/> Yes <input type="radio"/> No <input checked="" type="radio"/> Unknown		Specify <input checked="" type="checkbox"/> Asian - Burmese	
Marital Status		Medical Record Number		<input type="checkbox"/> Black or African American	
		View...		<input type="checkbox"/> Native Hawaiian or Other Pacific Islander	
				<input type="checkbox"/> Other	
				<input type="checkbox"/> Unknown	
				<input type="checkbox"/> White	
				Reported Race Asian	

Lyme Disease Incidence Form in WEDSS

Disease Incident

Patient: TEST,AMY

DOB: 01/01/1902

Incident ID: 916760

Disease: LYME DISEASE

Process Status: New

Resolution Status: Suspect

Patient

Supplemental

Lyme-LabClinical

Lyme-Risk

Lyme-Intervntn

Investigation

+

Lyme case definitions

-

Lyme - Clinical signs and symptoms

Did a physician or other medical professional diagnose patient w/ Lyme disease?

☐ Yes
☐ No

Symptom onset date

Did patient have a positive test result for Lyme disease?

LYME CONFIRMATORY SIGNS AND SYMPTOMS

EM rash (> 5 cm in diameter, physician diagnosed)

☐ Yes
☐ No
☐ Unk

Arthritis (objective episodes of joint swelling)

☐ Yes
☐ No
☐ Unk

Encephalomyelitis*

☐ Yes
☐ No
☐ Unk

Radiculoneuropathy

☐ Yes
☐ No
☐ Unk

Bells palsy or other cranial neuritis

☐ Yes
☐ No
☐ Unk

Lymphocytic meningitis

☐ Yes
☐ No
☐ Unk

2nd or 3rd degree atrioventricular block

☐ Yes
☐ No
☐ Unk

*If encephalomyelitis is checked "Yes", CSF titer must be higher than serum titer.

LYME NON-CONFIRMATORY SIGNS AND SYMPTOMS--check all that apply.

☐ Arthralgias

☐ Cognitive impairment

☐ Fatigue.

☐ Headache

☐ Myocarditis

☐ Other rash

☐ Paresthesias

☐ Visual/auditory impairment

☐ Bundle branch block

☐ Encephalopathy.

☐ Fever/Sweats/Chills

☐ Myalgias (muscle aches)

☐ Neck pain

☐ Palpitations

☐ Peripheral neuropathy

Symptom(s) not listed above

WEDSS Data Request

- If your LHD would like to access the Lyme Laboratory Report information in a different format, please contact:
DHSWEDSS@dhs.wisconsin.gov.
- WEDSS Manager: Amy Bittrich.
 - Phone: (608) 261-6857.

Additional Questions

For all vectorborne questions:

Diep (Zip) Hoang Johnson, Epidemiologist

Phone: (608) 267-0249

E-mail: diep.hoangjohnson@wisconsin.gov

For Lyme disease and electronic reporting questions relating to Lyme disease:

Chris Steward, Research Analyst

Phone: (608) 261-8354

Email: christopher.steward@wisconsin.gov